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LR-N18-0111

10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Salem Nuclear Generating Station Unit 2
Renewed Facility Operating License No. DPR-75
NRC Docket No. 50-311

SUBJECT: LER 311/2018-002-00
Automatic Reactor Trip Due to High 23 Steam Generator Water Level

This Licensee Event Report, "Automatic Reactor Trip Due to High 23 Steam Generator Water Level," is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR50.73(a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

Should you have any questions or comments regarding the submittal, please contact Mr. Harry Balian of Regulatory Affairs at 856-339-2173.

There are no regulatory commitments contained in this letter.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick A. Martino".

Patrick A. Martino
Salem Plant Manager

Enclosure – LER 311/2018-002-00

cc: USNRC Regional Administrator – Region 1
USNRC NRR Project Manager – Salem
USNRC Senior Resident Inspector – Salem
NJ Department of Environmental Protection, Bureau of Nuclear Engineering
Commitment Coordinator, Salem Generating Station
Corporate Commitment Coordinator, PSEG Nuclear, LLC



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

Estimated burden per response to comply with this mandatory collection request 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollections.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Salem Generating Station – Unit 2

2. DOCKET NUMBER

05000311

3. PAGE

1 of 3

4. TITLE

Automatic Reactor Trip Due to High 23 Steam Generator Water Level

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	14	2018	2018	002	00	11	12	2018	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

Mode 1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
090	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 368A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT

Harry Balian, Regulatory Compliance Engineer

TELEPHONE NUMBER (Include Area Code)

856 – 339 – 2173

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	SJ	LCV	308D	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO

15. EXPECTED SUBMISSION DATE

MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On September 14, 2018 Salem Unit 2 tripped from 90 percent power when 23 steam generator water level reached the HI-HI setpoint. This caused a trip of the main turbine generator, both steam generator feedwater pumps and closure of feedwater isolation and control valves. The trip of the main turbine generator caused an automatic reactor trip. All systems functioned as expected and Unit 2 was stabilized in MODE 3 at normal operating pressure and temperature.

The cause of the high water level was failure of 23BF19 (steam generator water level control valve). 23BF19 fully opened when a positioner feedback arm failed due to cyclic fatigue due to vibration. The positioner feedback arm was replaced and the station returned to operation at a reduced power level that did not induce the vibration. The feedwater control valve or the feedwater control system will be modified to adjust system parameters to reduce vibration.

This event is reported per 10CFR50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)," for this event actuation of the reactor protection system and the auxiliary feedwater system. Notification of this event was provided via ENS report 53606.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME	2. DOCKET	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
Salem Generating Station — Unit 2	05000311	2018	- 002	- 00

NARRATIVE**PLANT AND SYSTEM IDENTIFICATION**

Westinghouse-Pressurized Water Reactor {PWR/4}
Main Feedwater System / Level Control Valve {SJ/LCV}
Auxiliary Feedwater System {BA}
Reactor (Plant) Protection System {JC}
Main Turbine Generator {TG}
Steam Generator {SG}

IDENTIFICATION OF OCCURRENCE

Event Date: September 14, 2018
Discovery Date: September 14, 2018

FAILED COMPONENT

Manufacturer: Dresser Masoneilan
Model Number: SVI II AP

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Mode 1, operating at 90 percent power.

DESCRIPTION OF OCCURRENCE

On September 14, 2018 at 1323 Salem Unit 2 experienced a plant trip from 90 percent power when 23 steam generator {SG} water level reached the HI-HI set point. This caused a trip of the main turbine generator {TG}, both steam generator feedwater {SJ} pumps and closure of feedwater isolation and control valves. The trip of the main turbine generator caused an automatic reactor trip. All three auxiliary feedwater {BA} pumps started as expected to maintain steam generator water level. All systems operated as expected and Unit 2 was stabilized in MODE 3 at normal operating pressure and temperature.

Operation at 90 percent power caused vibration of the feedwater piping and valves. The vibration caused cyclic fatigue failure of 23BF19 position feedback arm. Failure of the positioner feedback arm caused 23BF19 to fully open. The fully open 23BF19 overfed the 23 SG. Overfeeding 23 SG caused a HI-HI water level in 23 SG. The HI-HI water level caused a main turbine generator trip and feedwater isolation. The main turbine generator trip caused the reactor protection system {JC} actuation.

This event is reported per 10CFR50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)," for this event actuation of the reactor protection system (RPS) and the auxiliary feedwater system. Notification of this event was provided via ENS report 53606.

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CONTINUATION SHEET**

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NARRATIVE**CAUSE OF THE EVENT**

The direct cause of the positioner feedback arm failure was fatigue due to cyclic stresses. Cyclic stresses were caused by vibration of the feedback arm. A recent design change to the feedwater control system resulted in a resonance frequency being created in the positioner feedback arm at certain power levels. The vibrations were sustained during the Unit 2 coast-down because the plant was maintained in the resonance region for longer periods of time than during normal plant operations, or during startup or shutdown.

SAFETY CONSEQUENCE AND IMPLICATIONS

No safety consequences are associated with this event. Operators responded appropriately to the failure of 23BF19 and subsequent automatic reactor trip. Plant response was as expected and designed. Failure of the 23BF19 valve positioner did not prevent automatic closure of 23BF19 in response to a main feedwater isolation signal. The feedwater isolation stopped the main feedwater flow and prevented excessive heat removal.

SAFETY SYSTEM FUNCTIONAL FAILURE

This condition did not result in a safety system functional failure as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines. This event did not result in a condition that would have prevented the fulfillment of a safety function of a system needed to shut down the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

PREVIOUS EVENTS

A review of previous events for the past three years did not identify similar events.

CORRECTIVE ACTIONS

The positioner feedback arm was replaced and the station returned to operation at a reduced power level that did not induce the resonance. The feedwater control valve or feedwater control system will be modified to adjust system parameters to reduce vibration.

COMMITMENTS

There are no regulatory commitments contained in this LER.